SAMPLING PLAN FOR
RICHARDSON FLAT TAILINGS
SUMMIT COUNTY, UTAH
TDD R8-8504-23

EPA REGIONAL SITE PROJECT OFFICER: ERIC JOHNSON

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SUBMITTED TO: KEITH SCHWAB - FIT DPO

BILL GEISE - REM-FIT COORDINATOR

DATE SUBMITTED: MAY 24, 1985

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SAMPLING PLAN FOR THE
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I. INTRODUCTION

Under the provisions of Technical Directive Document (TDD) R8-8504-23, Region VIII U.S. Environmental Protection Agency (EPA) tasked the Ecology and Environment, Inc. Field Investigation Team (E&E FIT) to prepare a sampling plan for Richardson Flat Tailings located in Summit County, Utah. This sampling plan has been prepared to satisfy the requirements of the above referenced TDD. The sampling plan also conforms to the requirements established in the Region VIII FIT Standard Operating Procedures (SOP III-2) for sampling.

II. OBJECTIVES

The Utah Department of Health Bureau of Solid and Hazardous Waste (BSHW) performed a site inspection in August, 1984. The purpose of the FIT site inspection follow-up is to increase the existing data base developed by the BSHW and to strengthen the HRS package. The sampling objectives are:

o Characterize the tailings and determine the levels of contaminants at the surface and below the surface. The surface characterization will be used to evaluate the off-site migration via the air route. The sub-surface data will be used to evaluate the potential for metals leaching and movement into the ground water.

o Determine whether ground water has been contaminated by leaching of metals from tailings.

o Investigate the potential for contaminant release via the air route by sampling off-site soils.

o Determine whether contaminants are being released to Silver Creek and to area intermittent streams.

III. BACKGROUND

A. LOCATION AND SITE DESCRIPTION

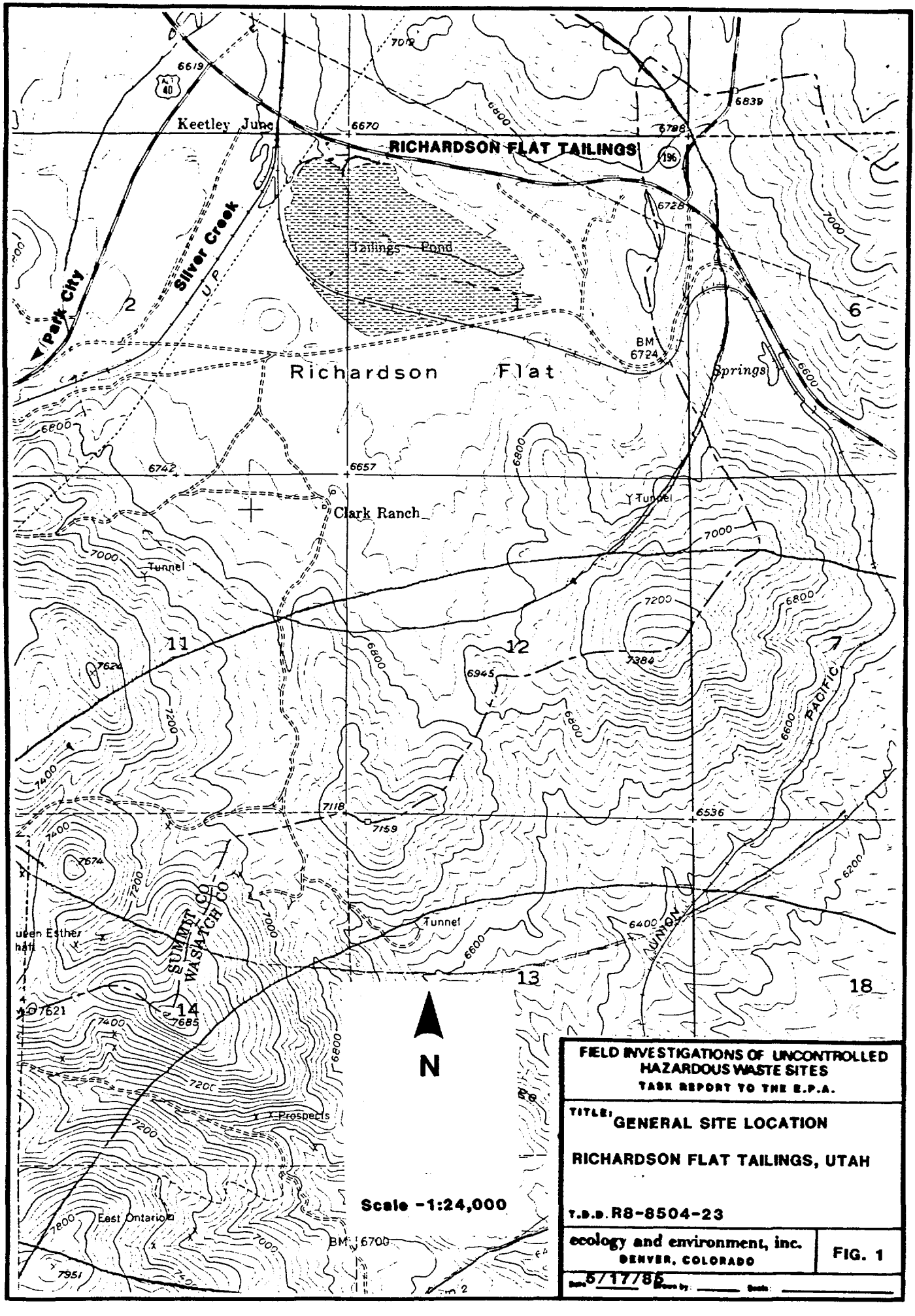
Richardson Flat Tailings is located in Summit County, Utah approximately 3.5 miles northeast of Park City, Utah (population 4,500). The tailings cover approximately 160 acres in the NW 1/4, Section 1, Township 2 South, Range 4 East (Figure 1). Highway 40 runs east and north of the area, and a Union Pacific Railroad track bisects the southern portion of the tailings. Silver Creek is approximately 500 feet from the northwestern-most extension of the tailings.

B. PREVIOUS WORK

A site inspection was performed in August, 1984 by the Utah BSHW. Tailings, soil, ground water and surface water samples were collected. No monitoring wells were installed and air monitoring for airborne particulates was not performed.

The FIT visited the site on May 8, 1985. At this time, a major portion of the tailings was under water. This is thought to be due to the seasonally high level of ground water. The site is easily accessible from all directions. Animal, human and motorcycle tracks were observed on the tailings. The FIT also observed dump trucks dumping fill dirt on-site. An intermittent stream flowing at the southern boundary of the site had a red-colored streambed, and waterfowl were seen in this creek.

The ephemeral lake overlying the tailings has been sampled in the past. For this reason and the fact that it does not flow over the dam, resampling will not be conducted.



FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.

TITLE: GENERAL SITE LOCATION

RICHARDSON FLAT TAILINGS, UTAH

T.D.D. R8-8504-23

ecology and environment, inc.
DENVER, COLORADO

FIG. 1

Date 5/17/85 Drawn by: _____ Scale: _____

Three existing monitoring wells are located below the dam. One of these wells (GW-3) will be resampled during this study. Previous ground water quality data from these wells is lacking.

C. SITE HISTORY

The following site history is based on a preliminary assessment and site inspection performed by Don Verbica, Utah Department of Health.

The mill tailings at Richardson Flat came from the Keetley Ontario Mine and other mines currently owned by United Park City Mines. It is estimated that approximately seven million tons of tailings were deposited on Richardson Flats. While there is no current dumping of tailings on site, Mr. Ray Wortey is leasing the tailings from United Park City Mines to use for sewer line and road base backfill.

D. SITE GEOLOGY AND HYDROLOGY

Richardson Flat lies within Parley's Park, a broad, gently rolling flat land north of Park City. The valley of Silver Creek which originates in Empire Canyon south of Park City, extends to the east as a narrow arm of the park. Unconsolidated deposits consisting of a poorly sorted mixture of clay to cobble-size material cover the area along Silver Creek to an approximate average depth of 60 feet. These deposits are saturated to within a few feet of the land surface. Recharge to the unconsolidated deposits in Parley's Park comes primarily from direct infiltration of precipitation on the park and runoff from surrounding mountains, and secondarily from subsurface inflow through the consolidated rocks (principally Weber Quartzite and Woodside Formation). Average annual precipitation for the area is approximately 20 inches (Baker, C.M., Jr. 1970).

IV. FIELD PROCEDURES

A. CONCEPT OF OPERATIONS

Well installation and sampling at Richardson Flat Tailings will be completed in conjunction with activities at Bauer Tailings, Tooele Smelter and Valley Materials Slag. The scheduled dates for these investigations are June 17 through June 30, 1985.

The proposed sampling plan includes the collection of surface water, soil and tailings samples during drilling activities. Ground water samples will be collected after installation and development of monitoring wells.

Two locations are proposed for monitoring wells:

o The background well will be located southeast of the tailings area.

o A second well will be placed northwest of the tailings pond between two railroad spurs and screened in the first encountered aquifer to evaluate the potential for horizontal movement of contaminants.

The drilling program will use dual tube, reverse circulation or air hammer/casing drive to drill a pilot hole to locate depth to water. Once the aquifer has been located, the hole will be reamed using the mud rotary method. A summary sheet of the drilling program and a map showing well locations are attached in Appendix A.

Drilling will move from the background well to the well in the northwest corner near the tailings proceeding in the direction of expected increasing contaminant concentrations.

Installation of a well into the tailings is not scheduled because most of the tailings are under water or saturated by seasonally high ground water. If at the time of the investigation the tailngs area is

dry and can support a drill rig, the FIT may install a well in the tailings.

In lieu of installing a tailings well, a hand augured hole will be drilled to about 10 feet. If the oxidation/reduction zone is encountered, three samples will be collected. Sampling locations will be from within the oxidized zone, from the enrichment zone beneath the oxidized zone and at the base of the tailings. These data will be used to characterize the contaminant content of the tailings. It is important to have data from the lower tailings because trace metals tend to leach from the oxidized zone and reprecipitate in the more reducing.

The FIT will consist of the following members:

Project Manager/Documentation: Susan Kennedy
Site Safety Officer: Tom Smith
Sampler: Dave Franzen
Sampler: Jeff Holcomb
Drilling Supervisor: Rob Smith
Drilling Assistant: Dave Tuesday

The possibility of conducting air sampling for airborne particulates is still being evaluated. This sampling development will be covered under a different TDD if the EPA and FIT determines air monitoring is necessary.

A hotline and personnel decontamination station will be established, the location and extent of which will be determined by levels of contamination observed at the site. It is expected that levels of protection will be Level D or Level C. All pertinent observations will be recorded in the site specific log book.

Access to the site will be coordinated through Mr. Eric Johnson, EPA Project Officer, or through a representative of the Utah BSHW. All safety and operational equipment will be provided by the FIT VIII

and will be transported in a FIT vehicle. Samples will be shipped by Federal Express to the designated laboratory from Salt Lake City, Utah.

B. SAMPLING LOCATIONS

This sampling activity includes the collection of three ground water samples, six surface water samples, three surface composite tailings, three subsurface composite tailings samples, and three composite soil samples. Table 1 describes the sampling locations and rationale for sampling. Approximate sample locations are illustrated in Figure 2.

C. SAMPLING METHODS

The FIT members will collect samples using methods in accordance with FIT SOP III-2. Ground water samples will be collected using a stainless steel bailer. Two to three casing volumes will be removed from each well prior to sample collection either by bailing or pumping.

All surface water samples will be collected directly from the stream into the appropriate bottles or by using a stainless steel bucket.

Soil and surface tailings will be composited using a triangular grid. At each point of the triangle, aliqouts will be collected from zero to six inches deep and composited to produce a sample. Three tailings samples will be collected from the hand augered hole. All samples will be composited over 18 to 24 inches. Sample intervals are discussed in concept of operations. The contact between the oxidized and the enriched zones should be discernible on the basis of color change due to reprecipitation of metals.

TABLE 1

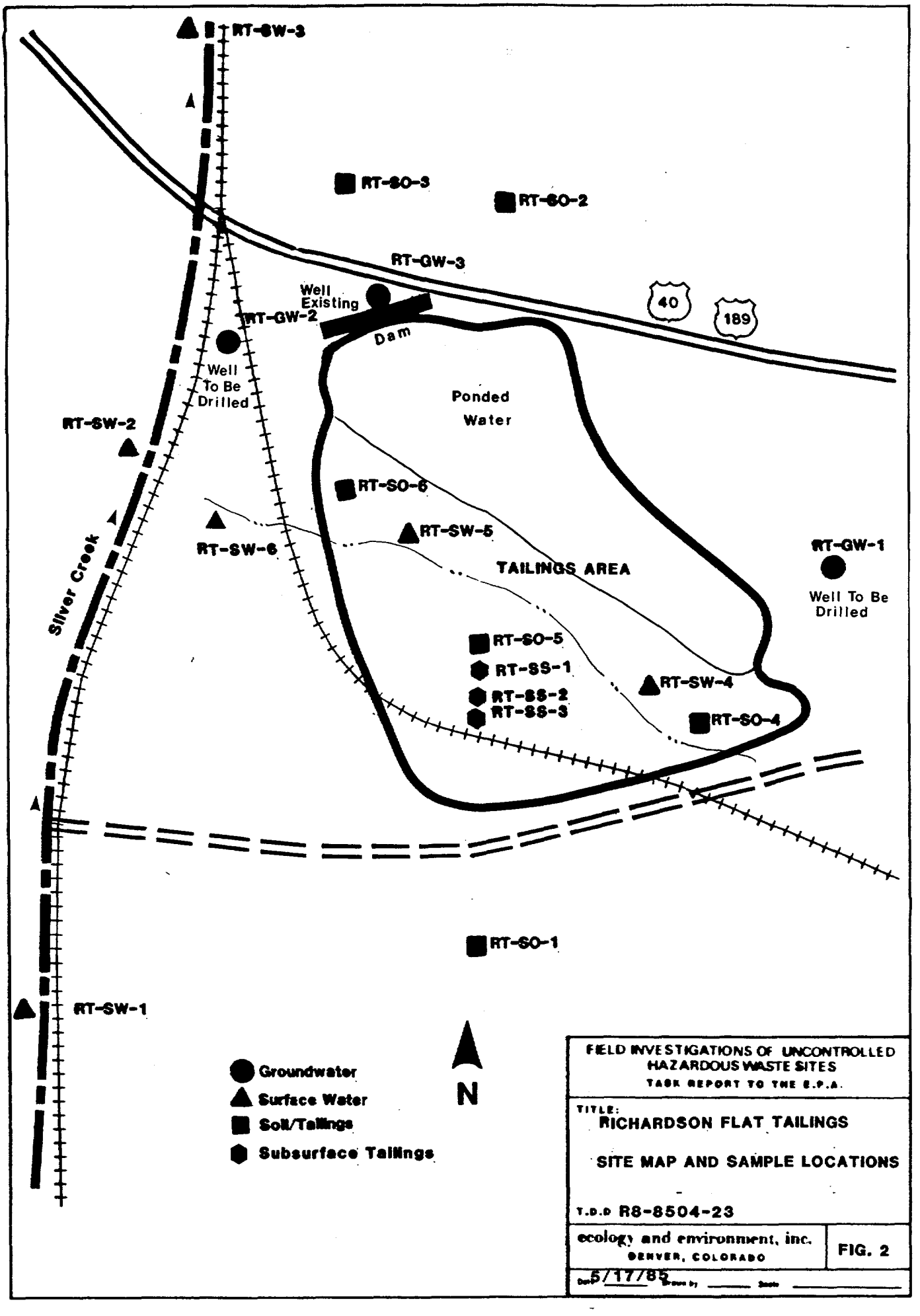
BREAKDOWN OF SAMPLE TYPES, PARAMETERS, LOCATIONS AND RATIONALES

SAMPLE MATRIX	SAMPLE NUMBER	LOCATION	RATIONALE
Ground water	RT-GW-1	Sampling well #1 (to be drilled); east of tailings between Hwy. 40 and gravel road.	Upgradient background sample.
round water	RT-GW-2	Sampling well #2 (to be drilled); northwest of tailings between fork of railway lines.	Downgradient of tailings area; to determine extent of lateral migration of contaminants in groundwater off-site.
Ground water	RT-GW-3	Sampling well #3 located just below (north) of tailings pond dam.	Downgradient of tailings area; to determine extent of migration of contaminants off-site.
Ground water	RT-GW-4	To be determined	Duplicate
urface water	RT-SW-1	Silver Creek,south of gravel road.	Upgradient background sample.
urface water	RT-SW-2	Silver Creek,west of tailings area.	To determine extent of lateral migration of contaminants in surface water off-site.
urface water	RT-SW-3	Silver Creek,northwest of tailings area, north of Hwy. 40.	Downgradient of tailings area; to determine extent of migration of contaminants in surface water off site.
Surface water	RT-SW-4	Drainage ditch through southeast portion of tailings.	To determine levels of contaminants in surface water on tailings.
Surface water	RT-SW-5	Drainage ditch, through central portion of tailings.	To determine levels of contaminants in surface water passing through tailings.
Surface water	RT-SW-6	Drainage ditch west of tailings; downgradient.	Downgradient of tailings area; to determine extent of migration of contaminants in surface water off site.
oil	RT-SO-1	Area south of tailings across gravel road.	Upwind background sample.
oil	RT-SO-2	Area north of tailngs across Hwy. 40.	Downwind of tailings area; to determine extent of wind-blown migration of contaminants off site.
Soil	RT-SO-3	Area north of tailings across Hwy. 40.	Downwind of tailings area; to determine extent of wind-blown migration of contaminants off site.

TABLE 1 - Cont.
BREAKDOWN OF SAMPLE TYPES, PARAMETERS, LOCATIONS AND RATIONALES

SAMPLE MATRIX	SAMPLE NUMBER	LOCATION	RATIONALE
Soil (tailings)	RT-SO-4	Southeast portion of tailings; surface sample.	To determine levels of contaminants in tailings.*
Soil (tailings)	RT-SO-5	Central portion of tailings; surface sample.	To determine levels of contaminants in tailings.*
Soil (tailings)	RT-SO-6	Northwest portion of tailings; surface sample.	To determine levels of contaminants in tailings.*
Subsurface Tailings	RT-SS-1	Oxidation zone; subsurface tailings, location to be determined.	To determine metal concentration in the oxidation zone as a comparison of levels present in the enrichment zone.
Subsurface Tailings	RT-SS-2	Enrichment zone; subsurface tailings, location to be determined.	To characterize levels of metals in the zone where greatest accumulation is likely to occur.
Subsurface Tailings	RT-SS-3	Same location as SS-1 and SS-2. Tailings sample at contact with alluvium.	To evaluate the potential for trace metal movement into the soil.

* Three composite tailings samples are necessary due to the heterogeneity of the tailings material.


RT-SW-3
RT-SO-3
RT-SO-2
RT-GW-3
Well Existing
RT-GW-2
Dam
40
189
Well To Be Drilled
Ponded Water
RT-SW-2
RT-SO-6
RT-SW-5
RT-SW-6
Silver Creek
TAILINGS AREA
RT-GW-1
Well To Be Drilled
RT-SO-5
RT-SS-1
RT-SW-4
RT-SS-2
RT-SS-3
RT-SO-4
RT-SO-1
RT-SW-1
Groundwater
Surface Water
Soil/Tailings
Subsurface Tailings
N
FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.
TITLE:
RICHARDSON FLAT TAILINGS
SITE MAP AND SAMPLE LOCATIONS
T.D.D R8-8504-23
ecology and environment, inc.
DENVER, COLORADO
FIG. 2
Date 5/17/85

D. CONTROL OF CONTAMINATED MATERIALS

If the FIT drills into the tailings, the cuttings produced will be scattered on the tailngs piles. Water produced during drilling will be poured onto the surface. The same disposal procedures will be used for the background well. Decontamination fluids will be disposed of in a trench onsite. Disposable sampling equipment, rubber gloves, protective outerwear, etc. will be placed in plastic bags and buried on site, if permitted.

E. ANALYTICAL PARAMETERS

Table 2 is the Sample Plan Check List. All samples will be analyzed for Task 1 and 2 metals and cyanides. Sulfate analysis of the ground and surface water (SAS) for the samples is also requested. It is desirable to analyze for sulfates because these anions indicate the occurrence of sulfide mineral oxidation and acid production. Sulfate mobility is greater than metals in ground water, and any information showing sulfate migration could be used to determine the potential for off-site migration of metals.

All samples are expected to be environmental. The number and type of sample containers are specified in Appendix B.

F. FIELD QUALITY CONTROL PROCEDURES

All samples will be preserved as described in the FIT SOP III-2. Calibration and operation of pH and conductivity meters will follow the instrument manufacturer's instructions and will be in accordance with Standard Methods for the Examination of Water and Wastewater. Sampling will proceed from areas of least to expected highest contamination. Sampling equipment will be decontaminated following collection of each sample using methods described in the FIT SOP III-2.

Prior to the mobilization of the drill rig on site, the rig and all associated equipment will be thoroughly cleaned to remove all oil,

TABLE 2

SAMPLE PLAN CHECK LIST

REGION VIII

Site Name: Richardson Flat Tailings

Address: ALT HWY. 40

City: KEETLY JUNC County: Summit

TDD Number: R8-8504-23

Project Team Leader: SUSAN KENNEDY

Sampling Date: JUNE 1985

Sample Location	Sample Type	Field Parameters					Laboratory Parameters															Comments
		Temp	pH	Cond	DO	Special	Task 1&2 Metals	Task 3 Cyanide	Task3 Sulfide	Task3 Ammonia	Special Anions	Special NO3&NO2	Special Inorganic	VOA	B/N/A Extract	Pesticide	Special Organic	Split	Dup	Trip	
RT-GW-1	ground water	✓	✓	✓			✓	✓			$SO_4^=$											
RT-GW-2	↓	↓	↓	↓			↓	↓			↓											
RT-GW-3	↓																		✓			Duplicate will be RT-GW-3A
RT-SW-1	surface water																					
RT-SW-2	↓																					
RT-SW-3																						
RT-SW-4																						
RT-SW-5																						
RT-SW-6	↓	↓	↓	↓			↓	↓			↓									✓		Triplicate for lab QA

TABLE 2 (continued)

SAMPLE PLAN CHECK LIST

REGION VIII

Site Name: Richardson Flat Tailings

Address: ALT. HWY. 40

City: KEELY JUNE County: Summit

TDD Number: R8-8504-23

Project Team Leader: SUSAN KENNEDY

Sampling Date: JUNE 1985

Sample Location	Sample Type	Field Parameters					Laboratory Parameters														COMMENTS
		Temp	pH	Cond	DO	Special	Task 1&2 Metals	Task 3 Cyanide	Task3 Sulfide	Task3 Ammonia	Special Anions	Special NO3&NO2	Special Inorganic	VOA	B/N/A Extract	Pesticide	Special Organic	Split	Dup	Trip	
RT-SO-1	Composite soil		✓				✓	✓													
RT-SO-2	↓		↓				↓	↓													
RT-SO-3	↓		↓				↓	↓													
RT-SO-4	Composite tailings		↓				↓	↓													
RT-SO-5	↓		↓				↓	↓													
RT-SO-6	↓		↓				↓	↓													
RT-BL-1	blank water	✓	✓	✓			✓	✓			$SO_4^=$										Blank for lab QA
RT-SS-1	Split spoon Tailings		✓				✓	✓													Will be collected if drill in tailings or if hand auger is possible
RT-SS-2	↓		✓				✓	✓													↓
RT-SS-3	↓		✓				✓	✓													

grease, mud, tar, etc. This cleaning process will consist of 1) high-pressure hot-water cleaning of the drilling equipment, 2) rinsing the equipment with methanol, and 3) a high-pressure hot-water final rinse. The subcontractor will provide all equipment necessary for this cleaning process. This equipment may include clean water, methanol and a mobile high-pressure hot-water washer.

Unless otherwise specified by the E&E on-site coordinator, all sampling equipment will be cleaned between samples with a methanol and clean water rinse in order to minimize contamination. Before drilling each boring, the drive casing, cutting bits and drilling rods will be cleaned with pressurized water and rinsed with methanol and clean water. Special attention will be given to the thread section of the casing and to drill rods. Metal or petroleum-based lubricants will not be used to prevent binding. The subcontractor will be responsible for providing a means for collecting contaminated solvent, wash water, and related materials.

The following types of samples will be provided for quality control:

- Blanks - to check field procedures for decontamination, a blank will be prepared by pouring Baker Instra-Analyzed Water through sampling equipment following ground and surface water sampling.

- A duplicate ground water sample and a triplicate ground water sample must be collected for the CLP.

- Background samples will be obtained from soil, surface water and ground water.

- Splits will be provided to the operators, if requested. EPA or State representatives will determine if site owners require sample splits.

G. CHAIN OF CUSTODY

After collection and identification, all samples will be handled in strict accordance with chain of custody protocol prescribed by the NEIC Procedures Manual for the Evidence Audit of Enforcement Investigation by Contractor Evidence Audit Teams, April 1984 (EPA-300/9-81-003-R).

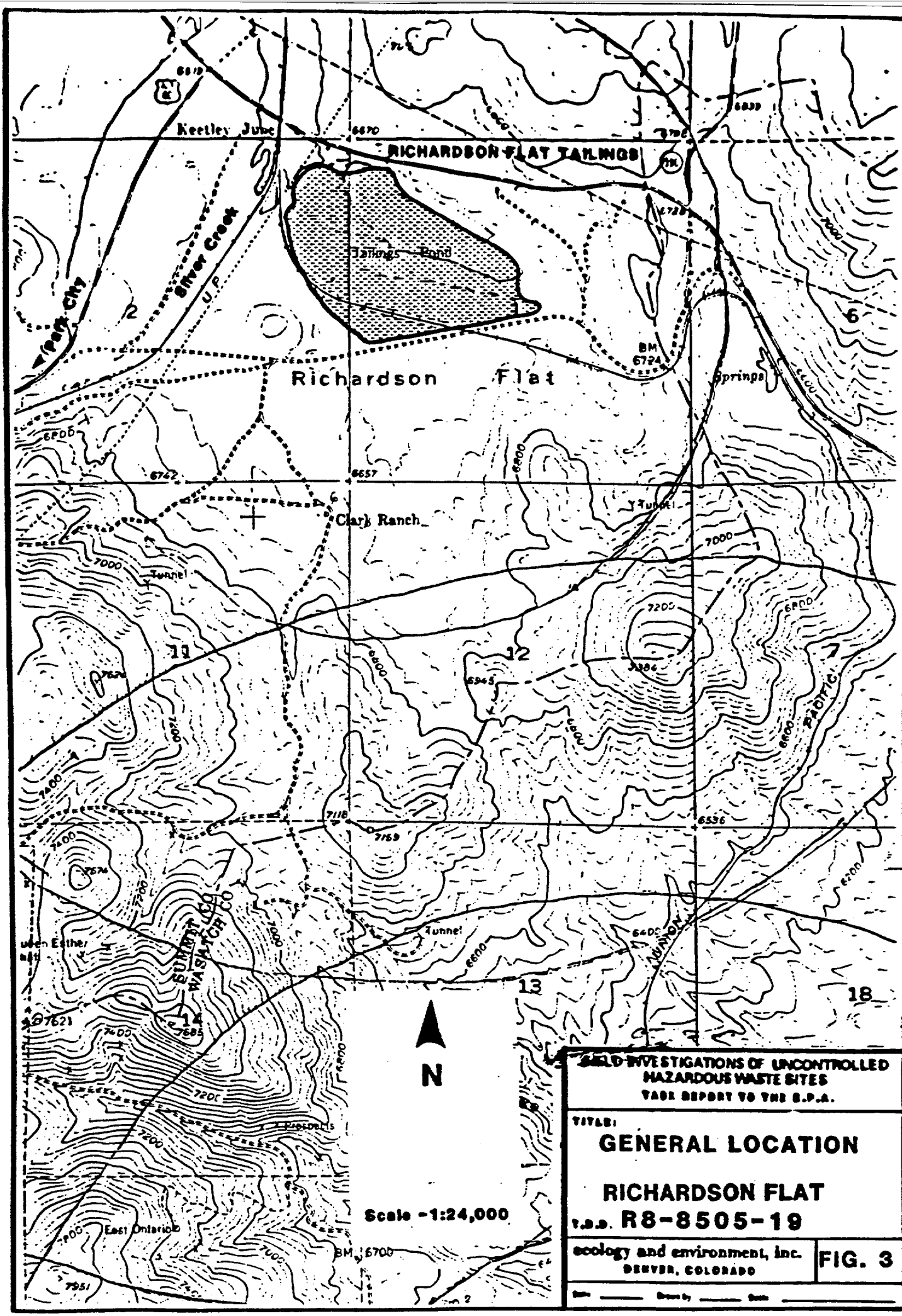
V. SAMPLING REPORT

Two weeks after the completion of the sampling trip, a report of sampling activities, a draft Site Inspection form and a draft HRS score will be submitted to EPA Region VIII.

Two weeks after the receipt of the analytical data, an Analytical Results Report, a final Site Inspection form and a final HRS score will also be submitted to the EPA Region VIII.

APPENDIX A

DRILLING SUMMARY



FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.

TITLE:

GENERAL LOCATION

RICHARDSON FLAT

T.D.D. R8-8505-19

ecology and environment, inc.
DENVER, COLORADO

FIG. 3

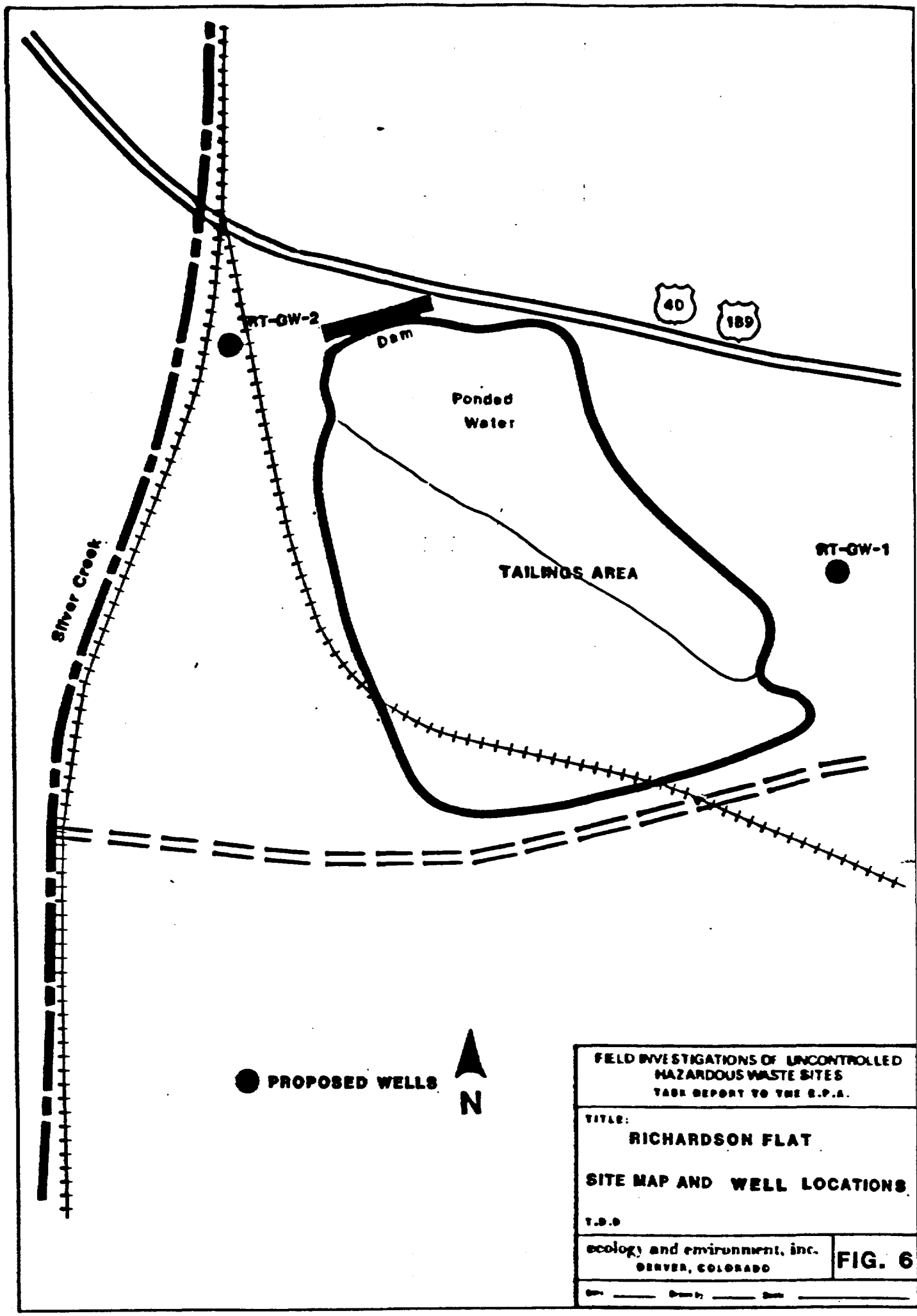

RT-GW-2
Dam
40
189
Ponded
Water
RT-GW-1
TAILINGS AREA
Silver Creek
PROPOSED WELLS
N
FIELD INVESTIGATIONS OF UNCONTROLLED
HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.
TITLE:
RICHARDSON FLAT
SITE MAP AND WELL LOCATIONS
T.D.D
ecology and environment, inc.
DENVER, COLORADO
FIG. 6

TABLE 3 Site Summary AND Well Construction Shee

Site: RICHARDSON FLAT TAILINGS

TOD NO.: R8-3505-19

WELL SPECIFICATIONS

Total Number of Wells: 2
Minimum well depth (Ft): 50
Maximum well depth (Ft): 100
Depth to water table (FT): 10 (?)
Borehole Diameter (IN): 9
CASING MATERIAL (IN): 4.33 Fiberglass
SCREEN MATERIAL (IN): 4.33 Fiberglass
PACKING MATERIAL (SAND): 6-9 mesh silica sand

} See Figure 7.

DRILLING CONDITIONS

~~GEOLOGIC~~

Formation type: unconsolidated alluvium ranging from silt to cobble
Depth to BEDROCK (FT) 100
LOST CIRCULATION PROBLEMS Expected? (YES) NO
CAVING conditions Expected? (YES) NO
Rig preference: DUAL TUBE REVERSE CIRC OR AIR hammer/CASING DRIVE
Well Development method: AIR LIFT SURGE

MOVE ABOVE

PERMITTING
SITE ACCESS AND SAFETY

SITE ACCESS PROBLEMS ANTICIPATED? yes NO. (MAYBE)
TYPE OF PROBLEM expected: SOFT, WET GROUND
WELL PERMITS to be obtained by: DRILLER (E&E)

Vertical Contact Logistics
Geophysics
Pump installation

- Return of ~~Title~~ Inspection Subcontractors
- Permits

SPECIAL CONTRACT CONDITIONS

Borehole Geophysical Logging ? yes (NO)
Type of logs required : none

Pump Installation ? yes (NO)
Purpose of Installation : N/A

APPENDIX B

SAMPLE PRESERVATIVES AND BOTTLE REQUIREMENTS

APPENDIX B
SAMPLE PRESERVATIVES AND BOTTLE REQUIREMENTS

SAMPLE	PARAMETER	# OF CONTAINERS (PER SAMPLE)	CONTAINER	PRESERVATION
Water	Metals	1	1-L polyethylene bottle	HNO_3 to pH < 2 Cool to 4°C
	Cyanide	1	1-L poly	NaOH to pH > 12 0.6 g ascorbic acid Cool to 4°C
	Sulfates	1	1-L poly	Cool to 4°C
Soils/ Tailings	Metals/Cyanides	1	8-oz. wide-mouth glass jar	Cool to 4°C